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AUTHOR Cavanaugh, Terence; Cavanaugh, Catherine
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ABSTRACT

This paper is an excerpt from a book on learning science using science fiction. The focus is on the use of science fiction films to engage students and encourage greater enthusiasm and interest in science. "Jurassic Park" is used as an example that can provide educators with countless lesson opportunities. This approach recommends the use of fun as an effective tool for motivating students and takes the stance that science is a vehicle for comprehension. Definitions of science fiction and a comparison of science fiction literature with science fiction films; a rationale for using science fiction to teach science; methods for using science fiction in the classroom; and sample lessons for the films "Destination Moon," "Star Trek" (Immunity Syndrome episode), and the "Forbidden Planet" are presented. Contains 15 references. (DDR)

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Learning Science With Science Fiction Films

Paper presented by
Terence Cavanaugh
(cavanat@mail.firn.edu)
Lely High School, Naples, Florida
and
Catherine Cavanaugh
(cavanac@mail.firn.edu)
Whitaker Center for Math, Science and Technology
Naples, Florida

Florida Association of Science Teachers
Key West 1996

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Learning Science with Science Fiction Films:

(Exerpted from Learning Science With Science Fiction Films by Terence W. Cavanaugh & Catherine S. Cavanaugh, 1996, Kendall Hunt Publishing Company.)

Science fiction has always been a staple of motion pictures. Movie audiences have journeyed to the center of the earth and the furthest reaches of space. They have ridden in the Nautilus beneath the sea and limped around the moon and back with the crew of "Apollo 13". Spielberg alone has terrorized them with a shark and recreated the age of the dinosaur.

Science educators are in constant battle to change the preconceptions of students who are inspired - and confused - by the movies and television programs they see. But, these films also open a wonderful opportunity to engage the students and encourage greater understanding and interest. Consider the film "Jurassic Park". It provides educators with countless lesson opportunities. There is the question of the theoretical science within the confines of the film as well as of the practical science that went into making the special effects. It allows an opportunity to compare and contrast two drastically different eras of life on this planet. It also addresses the ethics of technological advancement. And, it's fun to watch.

The "fun" is perhaps the best weapon in a science teacher's arsenal. Science is fun and students need to see that. Too many potential scientists have been put to sleep and lost forever by the monotonous voice-overs and bland renderings that have been the hallmarks of classroom films for decades.

Lessons using science fiction video can be designed to help students translate what they see on the small screen into the big picture. Science is a vehicle for comprehension. It allows us to better understand ourselves and our surroundings. It teaches us how to make decisions and consider the future consequences of our actions.

What is science fiction?

Science fiction can be described as a branch of literature in which scientific discoveries and developments form elements of plot. It is based on future prediction of scientific possibilities, some of which have become facts.

Agreement does not seem to exist on one comprehensive definition of science fiction. Science fiction seems to have different meanings, depending on whom you ask. Some very well known science fiction authors describe their genre in a variety of ways. Robert Heinlein's definition includes realistic speculation based on understanding of the scientific method. Issac Asimov's description deals with fictitious societies different from ours in technological development. Harlan Ellison's states that science fiction incorporates the future of man and science. In Theodore Sturgeon's view, human problems and solutions with scientific content are the basis around which science fiction stories are built. Damon Knight has identified common elements in science fiction including: science, technology, a distant time or place, and the scientific method. And some people even go so far as to define science fiction as anything the publishers label as science fiction.

Science fiction film differs from science fiction literature in that film focuses on the action involved in solving a problem while literature provides more of the background reason for the problem. Science fiction films often explore modern world problems and issues and provide

the opportunity to consider the future and the changes that may occur. Science fiction films can be much more than just special effects, they can be the promoters of ideas and change.

Why use science fiction to teach science?

Science fiction media combine science and pseudoscience for entertainment. Science fiction television shows and movies are the strongest influences on students for promoting science, according to Purdue University research (*USA Today, The Magazine of the American Scene*, August, 1994). Interest in science can be increased and developed by science fiction. Science fiction can also help improve attitudes toward real science.

Advanced and abstract science topics such as mutations, radiation, ethics, and rocket science can be experienced by using science fiction . While hands-on direct experience is the best way to learn, often that is not possible or practical. Using science fiction allows students to experience a wide variety of science topics. Science fiction is a way for students to encounter concepts in a new context; this provides a new avenue for learning. Students are more likely to remember information they have been involved with in an entertaining or enjoyable way.

According to Dubeck, Moshier, and Boss (*Science in Cinema,* 1988), "using science films and literature to teach science can motivate a far broader spectrum of students in science than can be motivated by traditional methods." And in a recent article in the Los Angeles Times, professors and lecturers around the country use science fiction films and videos "to illustrate ideals, concepts, and scientific theories." (Delrado, 1995)

Viewing science fiction films improves learning science in various ways. The films allow direct visualization of abstract topics. High interest in science fiction facilitates learning related concepts. Discussion of science fiction films develops understanding of science processes, and the interconnectedness of science disciplines. Science fiction provides a strong motivation for learning content.

How to use science fiction in the classroom

When used to introduce a topic, a film lesson serves as a common reference point and shared experience for the class. The film can develop the students' initial interest in a subject that may be unfamiliar. "Destination Moon" can work as an excellent introduction to the study of space travel, for example, because it shows a cartoon and live action sequences which illustrate the details involved in a moon mission.

As a concluding activity, a film lesson can provide points for discussion, reinforcement of facts learned, and a context for subject matter. Once students have the basics, they can then use the ideas from the films as areas for further research. After students have been taught about the structure of cells, for instance, they will recognize the parts encountered in the giant cell of "The Immunity Syndrome," and will be proud to point out some cell errors.

Science fiction films can also be used as the basis of an interdisciplinary activity. Students could read a book on which a film is based, or develop their own scripts, contrast societies and customs from the movie to present day, create scale models or story board representations of scenes to learn about film production and special effects, and analyze any mathematical concepts. The film "Forbidden Planet" could easily be developed into an interdisciplinary unit. The film contains a number of math and science references, uses a variety of filming techniques, contains references to Greek mythology, and is based on Shakespeare's play "The Tempest."

Adapted from the book: *Learning Science With Science Fiction*
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These films can provide an excellent core for the development of a lesson. A less formal use of a science fiction film could be to use specific film segments to illustrate a point or as an example of a concept. Teachers could also go so far as to write their own software programs using such tools as Linkway or Hypercard and a videodisc player to create interactive lessons or presentations.

Sample Introduction Lesson: Destination Moon

Objectives: Students will see, write about, and learn about: Space exploration and conditions, rocketry, and the physics of space using the film *Destination Moon*

Procedures:

1. Students will define and discuss the given vocabulary list.
2. Students will begin answering questions from the worksheet while watching the movie, stopping periodically for discussion as needed.
3. Once the complete film has been seen, the class will answer the mathematics/discussion question section.
4. Optional: Actual NASA footage of moon missions may be shown at this point to provide contrast.
5. A discussion of the film or a writing assignment using the discussion/essay questions.
6. Do the lab activity *Size of the Sun and Moon.*

Expected Outcomes:

Students will be able to recognize events in the film that are different from actual history.
Students will gain knowledge of conditions in space and on the moon.
Students will understand that the film is accurate in its depiction of scientific facts.

Sample Concluding Lesson : Star Trek® Cells

Objectives: Students will see, write about, and learn about: cell structures, cell functions, and immunity responses, using the "Star Trek® : Immunity Syndrome" episode.

Procedures:

Day 1: Students will define and discuss the given vocabulary list. Students will begin answering questions from worksheet while watching the episode.
Day 2: Students will complete answering questions from the episode. The class will then discuss the follow up questions.

Sample Interdiscplinary Lesson: Forbidden Planet

Science: Students will watch the film and do the related science activities included in the Learning Science with Science Fiction Films book. They will also do the lab activity *Personal Radiation Dose.*

Math: Students will do work involving calculations of speed, and learn the concepts of powers of ten. Students should also do calculations involving gravitation to determine weight.

Social Studies: Students will use the film to compare the length of exploratory voyages through history and the nature of the "frontier."

Art: Students will create their own story board representations of scenes or settings, or students will develop their own costume designs.

Language Arts: Students will study the play "The Tempest" and compare the play to the film.

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